(LAZLO TORMA)

IN THE DISTRICT COURT OF THE EIGHTEENTH JUDICIAL DISTRICT
OF THE STATE OF MONTANA IN AND FOR THE COUNTY OF GALLATIN

DALE FOLKVORD, FRANCIS FOLKVORD, and DEAN FOLKVORD, and WHEAT MONTANA FARMS, INC., a Montana Corporation,

Plaintiffs,

vs.

E.I. DuPONT DeNEMOURS AND COMPANY,

Defendants.

No. DV-86-67

Bozeman, Montana
March 12, 1987

DEPOSITION UPON ORAL EXAMINATION OF LAZLO TORMA

PREPARED FOR:

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ABBY WASS, COURT REPORTER
CHARLES FISHER COURT REPORTING
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DEPOSITION UPON ORAL EXAMINATION OF LAZLO TORMA

BE IT REMEMBERED, that the deposition upon oral examination of LAZLO TORMA, appearing at the instance of Defendant, was taken at the office of Charles D. Fisher Court Reporting, 221 East Mendenhall, Bozeman, Montana, on the 12th day of March, 1987, beginning at the hour of 8:50 o'clock A.M., pusuant to the Montana Rules of Civil Procedure and pursuant to Notice, before Abby Wass, Court Reporter - Notary Public.

APPEARANCES

ATTORNEY APPEARING ON BEHALF OF THE PLAINTIFF, DALE FOLKVORD, FRANCIS FOLKVORD and DEAN FOLKVORD, and WHEAT MONTANA FARMS, INC.:

MR. CALVIN BRAAKSMA, ESQ.
Landoe, Brown, Planalp, Kommers & Johnstone
P.O. Box 1
Bozeman, Montana 59771-0001

ATTORNEY APPEARING ON BEHALF OF THE DEFENDANT, E.I. DuPONT DeNEMOURS AND COMPANY:

MR. CHARLES R. CASHMORE, ESQ.
Crowley, Haughey, Hanson, Toole & Dietrich
P.O. Box 2529
Billings, Montana 59103-2529

ALSO PRESENT

Rod Warner

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Torma Exhibit 16 - Lab Report - 29 July 1985 with supporting documents re: Glean analysis for Folkvords by Chemistry Station at MSU 16-44-46

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WHEREUPON, the following proceedings were had and testimony taken, to-wit:

. . . .

LAZLO TORMA,

called as a witness herein, having been first duly sworn, was examined and testified as follows:

MR. CASHMORE: Let the record show that the deposition of Lazlo Torma is being taken today pursuant to Notice and in accord with the Montana Rules of Civil Procedure.

EXAMINATION

BY MR. CASHMORE:

Q. Would you state your name, please, for the record?

A. Lazlo Torma.

Q. And where do you reside?

A. Bozeman, Montana.

Q. And by whom are you employed?

A. I'm employed by the Montana Department of Agriculture and the Agricultural Experiment Station.

Q. And in what capacity are you employed by the Department of Agriculture?

A. Laboratory manager of the analytical laboratory.

Q. And where is that laboratory located?

A. It's located on the Montana State University campus.

Q. What is the connection or relationship between the Department of Agriculture and the university? I mean, why is the Department of Agriculture lab on the university campus?

A. The analytical laboratory is jointly operated by the Montana Department of Agriculture and the Agricultural Experiment Station of Montana State University; and, by an agreement between the two agencies, it is operated by one manager; namely, me in this case.

Q. All right. But your employer is the Department of Agriculture?

A. Correct.

Q. And who is David Quist?

A. David Quist is one of the pesticide specialists for the Montana Department of Agriculture.

Q. And does he also work on the university campus?

A. No, he does not.

Q. Where is his office located?

A. Downtown Bozeman.

Q. Now, do you work with him, on occasion, in connection with lab work that he might be involved in?

A. Not laboratory work, no.

Q. All right.

A. Related to laboratory work when he is sampling, submitting samples to the lab only.

Q. Would you describe for me your educational background?

A. Educational background? I was mostly educated in Hungary, studied veterinary toxicology in Hungary, came to this country in '56, started learning English -- and still learning -- and then I went to Colorado College in Colorado Springs, where I had a scholarship, and completed chemistry at Colorado State U, Fort Collins.

Q. What is the highest degree level that you've obtained?

A. A B.S. in this country.

Q. In chemistry?

A. Yes.

Q. And when did you complete your B.S. in chemistry?

A. '65.

Q. Since that date, what has your employment history been?

A. Employed primarily by Montana State University and the Department of Agriculture in Bozeman as a chemist -- bench chemist -- and supervisor and now the manager for the laboratory.

Q. Do you hold any faculty position at the State University?

A. Courtesy appointment.

Q. Do you teach any courses?

A. No.

Q. So, since your education in Colorado was completed in 1965, you have worked in Montana since then?

A. Yes.

Q. All right. In June of 1985 were you requested to perform laboratory analysis on some soil samples that had been taken from the Folkvord farm in Three Forks?

A. Correct.

Q. And who requested that you perform that analysis?

A. Mr. Dave Quist.

Q. Okay. Now, have you ever performed or supervised the performance of a chlorsulfuron analysis prior to June of 1985?

A. Supervised.

Q. In this particular case did you perform the analysis yourself or did you supervise the performance?

A. Supervised.

Q. Does the laboratory that you supervise frequently perform chlorsulfuron analyses?

A. "Frequently," I'm not sure what you mean, but we are one of the few laboratories in the country who can do this type of analysis; therefore, we are doing more than any other laboratory except perhaps the company.

Q. When you refer to "the company," you're referring to DuPont?

A. DuPont, correct.

Q. Has your lab, under your supervision, ever performed any chlorsulfuron analysis at the request of DuPont?

A. Not directly, to my recollection; however, we were referred by DuPont to growers or DuPont salesmen to do their work.

Q. Can you recall the last time, prior to June of 1985 that your lab did perform a chlorsulfuron analysis?

A. I'm not positive of that. I think it was either just before or just after we had the other group of samples for Glean and then also for Oust, which is the same type of a compound as Glean.

Q. So, some time before June of 1985, you did perform a chlorsulfuron analysis on some soil samples?

A. That's how I remember, yes.

Q. Do you recall at whose request that was done and for what purpose, if you know?

A. No, I'm not sure, I don't remember.

Q. Do you know where the soil samples came from?

A. I believe it was Montana, but not positive.

Q. Okay. Has your lab performed any chlorsulfuron analyses that, to your knowledge, are related to or were performed for purposes of this Folkvord Glean problem that

we're involved with -- if you know -- other than the Folkvord analysis itself?

A. Not to my knowledge, not to my knowledge.

Q. Has your lab performed any chlorsulfuron analyses designed to show the gradual dissipation of residue of Glean in soil samples, to your knowledge?

A. Degradation of the soils; is that what you are referring to?

Q. Yes, yes.

A. We are doing one study right now, currently being done. One of our researchers on the campus is doing the analytical work.

Q. Who is that researcher?

A. Pete Fay.

Q. Okay.

A. Not chlorsulfuron, but methylsulfuron we have done for the Department of Agriculture. After they were spraying right-of-ways on railroads and highways -- I believe it was last year -- there was a shotgun-type of a sampling to see if we were having any problem or not.

Q. That was not chlorsulfuron, though?

A. No, that was the Oust. That was the Oust, the methyl.

Q. Now, the study that you are currently doing for Pete Fay, what kind of analysis are you doing for him? I

mean, what does his study entail? Does it deal with the degradation of --

A. I'm not sure what his primary purposes of study are. My purpose is to generate reliable analytical data for him on the samples that he collected from various areas. I'm not involved in the actual design of his research.

Q. Have you discussed his reasearch with him so that you know from him telling you what the design of his research is?

A. Not with him, no.

Q. Have you discussed the design of his research with anyone else for this particular project?

A. A little bit, very little bit, yes.

Q. What is your understanding -- however limited -- as to the project that he's undertaking?

A. What I understand what he's doing is trying to design a biological test to be able to show if Glean is present in the soil at such level that it may damage certain crops after changing crops in a given field. He's putting a row of different type of seeds into the field which are mixed and have different sensitivity to Glean.

Q. Is this his chlorsulfuron-detector work that he's doing?

A. Right, right, basically that's my understanding, right. That's my understanding.

Q. And is the lab work that you're doing for him in connection with that research, does that measure the chlorsulfuron in the soil or in plants?

A. In the soil, what we are doing. He's observing visually the reaction of the plant in the field.

Q. Has your lab work on that project of Pete Fay's involved the repeated sampling from the same field, to your knowledge?

A. Not what I know of. Not having a very good description of the samples -- just identified with the code numbers -- I'm not aware of it one way or another.

Q. All right. When you were requested by David Quist to perform the lab analysis on soil samples from the Folkvords' farm in June of 1985, what was requested of you? What were you asked to do?

A. To analyze those soil samples, which he brought in, for Glean.

Q. And the active ingredient in Glean is chlorsulfuron?

A. That's correct.

Q. Did you or any of the people in your lab participate in taking the soil samples?

A. Usually not.

Q. Do you recall in this case whether --

A. We did not go; via David.

Q. So the soil samples were brought into the lab by Quist; is that correct?

A. That's correct.

Q. And you don't have any knowledge as to how the samples were taken or --

A. No, we do not.

Q. -- or any of the sampling process itself?

A. No.

Q. Were you told anything about the sampling process; for example, the depth of the soil samples, any of that information?

A. I'm not sure if it was specifically told to us. The only record I've found was that handwritten page when the samples came in, taken by my secretary, from Dave. I'm generally aware of Dave's sampling technique because I was the one or one of the individuals who trained him -- the pesticide specialists -- so usually we talk about it but very briefly, and there is a given understanding what is going on.

Q. You said that you were one of the people who trained Dave in sampling procedures?

A. And other pesticide specialists.

Q. Okay. Where did you learn the proper technique for sampling, taking samples?

A. Training sessions from the FDA, EPA, private

corporations including DuPont, communications with various scientists and my own experience.

Q. Would you describe for me the proper sampling technique to be utilized in taking a sample for this type of test, for a chlorsulfuron test?

A. Depending on the purpose of the sampling, first of all, is you are going to have to design the sampling procedure. If you are attempting to show an average level of the compound in, let's say, a 40-acre field, you are going to make composite samples. If you are trying to prove and show that there is a drift situation, for example, and/or a high residue -- for whatever purposes and reasons there -- then you are going to be local sampling on the field.

Depending on the soil condition, moisture and gravel and rocks in the soil, you are also going to be designing the sampling differently. In a good soil, which is relatively air dried with a limited amount of gravel and rocks in it, you can use a probe and go down to four to six inches deep, make the composite either of the whole field and/or in a given area of the field.

After making the composite, making the field mixing, transferring it into the appropriate shipping container -- usually a clean glass container -- sealing it down -- I usually suggest aluminum foil for pesticide work -- and then cooling the sample and getting it ready for

rule

shipping, this is the hotline of mine for the sampling procedure.

If you are having lots of rocks, you should be pulling some of those rocks out as you are sampling, and you may have to use a shovel versus a probe.

Q. Now, you said that taking a composite sample is the technique to use in determining the average quantity of the pesticide in the soil; is that correct?

A. If you can take that, yes.

Q. All right. And that, if you are attempting to analyze the amount of the pesticide just in one isolated location, then you just take the spike; is that correct?

A. From that area, if it's a small area, perhaps one spot; it it's a larger area, you may take three or four spots which you also composite. That would be the average of that given area.

Q. So is there any particular method that should be used in determining how many spikes you want to take from a particular area, depending upon the size of the area?

A. Depending on the size of the area; you are having a field, you're walking and sampling, for example, in the shape of a "W", and at each point of the "W" is a site of sampling.

Q. If you were going to determine the average amount of the pesticide, let's say, in one acre, how would you

properly sample to determine that average?

A. If it's a small field like that, you can go in and walk the "W" on that field and just taking --

Q. About five spikes?

A. -- five spots, mixing it very well, take a portion of that and submitting it to the laboratory. You can also probably make it with three spots in a one-acre field.

Q. If you were going to analyze the quantity of a pesticide at different depths in a field -- and, as you may know, in this case we have a history of Glean application on some of the Folkvord fields over a period of years; in some cases, three applications -- is there a testing sample that could be used to determine the different quantities of Glean at various depths?

A. You can do a soil profile testing where you are going to slice into the soil and then taking from zero to two inches, from two to four or from four to six and so forth, and that certainly can be done. On occasions, we are doing that, when regulatory needs are arriving, to find out how deep a given chemical may be leached into the soil.

Q. Do you know what sampling method was used for purposes of the June, '85 analysis?

A. I don't remember specifically. I assume, however, that Dave was sampling in a composite way, but I'm sure. I don't remember what we were discussing and if we discussed

anything really.

(Whereupon, Torma Exhibit 16
was marked for identification
by the Court Reporter.)

BY MR. CASHMORE:

Q. I'd like to show you what has been marked as Deposition Exhibit No. 16; and, if you'd like to, you can compare that photocopy with the documents you brought, but what we've attempted to do is make a copy of the lab papers that you brought with you this morning.

Is there anything contained in Exhibit 16 which would indicate the manner in which the samples were taken or any of the details of the sampling itself?

A. Not related to sampling, not related to sampling.

On this page is the paper when the sample came in, and the sample was taken into the laboratory from Mr. Quist.

Q. Okay. I've numbered the pages on the actual exhibit, and that one is number 8; is that correct?

A. That's correct.

Q. And tell me what that discloses.

A. Okay. It discloses the owner's name and others who to report the analytical data, discloses on the left side the analytical numbers; for example, 4491-1.

Q. Those are just the sample numbers, possibly?

A. Assigned by the laboratory, assigned by the

laboratory.

And, then, the sample descriptions; in this case -1 case is "Spring Wheat/East of House," which was, I assume the description of the sample where the sample is originating from; and the same way for all four samples. The fourth sample was, so called, field blank, identified as "Unsprayed west to shelter belt."

Q. I think that's "next," probably.

A. Next to shelter belt, excuse me.

And it is for Glean analysis, was requested; then my secretary's note that it was delivered by Dave Quist, pesticide specialist, "Not sealed & no special chain of custody requested." This is when the sample arrived, 6-11-85.

Q. Now, why don't you just turn to the next page, which is numbered on the exhibit as page 9, and tell me what that is.

A. This is a worksheet of the analyst where the individual puts down the final analytical data under the results column, for those given samples.

Q. So this document simply shows the sample numbers and the final results?

A. Correct.

Q. Now, if you'll turn to the next page, which on the exhibit is labeled page 10, and tell me what that page

shows.

A. This is also a worksheet of the analyst, indicating for the given sample what was the sample rate, what was the final volume of the sample solution, what kind of an instrumentation reading the individual observed and then calculations.

Q. And pages 10 and then the next page, 11, that contains that information for all four samples?

A. Page 10 and 11, yes.

Q. All right. Now, the sample weight -- it appears that for all samples, the sample weight was 50 grams; is that correct?

A. Correct.

Q. Now, is that the quantity that David Quist brought in?

A. No, that's an aliquot of that total sample, which is a quart jar of soil that was submitted by Dave Quist, usually filled two-thirds, three-fourths full. We are taking a portion of that for the analysis.

Q. So you take 50 grams from the quantity of each sample that he brought in?

A. Yes.

Q. And you said that he brought in one quart jar, two-thirds or so full, for each sample?

A. Correct.

Q. You've described what he brought in in terms of a quart jar, and this is 50 grams. How much of the quart jar is a 50-gram sample, just approximately?

A. About one-tenth.

Q. Now, the column following the sample weight was typed or printed as "Crucible Number." That's crossed out and looks like "Final Volume" --

A. Correct.

Q. -- is written in there. What does that all mean?

A. After the analyst goes through various manipulation, extraction steps, clean-up and so forth, the final volume in this case -- 1 milliliter -- is the one that the analyst is taking to the instrument for actual analysis.

Q. And the actual testing instrument is a liquid chromatograph?

A. A high-pressure liquid chromatograph.

Q. So the quantity that goes into the instrument is 1 milliliter?

A. No. That's the amount that we are extracting and concentrating from the 50 grams. Then a much smaller amount -- usually like a 10 microliter -- from that 1 milliliter is being injected into the instrument.

Q. Now, when you talk about concentrating from the 50 grams, that just means you take a smaller quantity or is it processed in some way?

A. Processed by evaporation, usually.

Q. By what?

A. Evaporation.

Q. All right. And the column "Aliquot," what does that refer to?

A. If you had to make a dilution because a high level of that compound is present, then you may have to make a dilution of the 1 milliliter and bring it up to a higher quantity so it will set and fit on our chart.

Q. Now, when you extract the 1 milliliter from the 50 grams, you said that that was done through evaporation. If you could explain that to me, what are you evaporating?

A. Well, you have the sample -- the 50 grams -- and you're extracting that sample with solvents.

Q. Now, the 50 grams is actually soil; is that correct?

A. That's the soil.

Q. All right.

A. Then you add organic solvents and you're extracting that chemical -- you're taking it through various steps -- and, eventually, you are going to evaporate the organic solvents, which are usually a relatively large volume, down to a 1-milliliter volume, which then goes through the instrumentation.

Q. All right. Well, are you removing, in effect, the

soil from the sample and leaving the chemical; is that what you're doing?

A. When you are extracting the organic solvents, you are extracting the chemical from the soil.

Q. Okay.

A. And a certain amount of residue and the soil then eventually is just left behind, but the chemical is taken out from the soil.

Q. So what you put into the instrument is the chemical itself?

A. Yes.

Q. Now, the column labelled "Reading," that refers to the reading on the instrument?

A. I believe, in this case, that's what it was. We don't have, unfortunately, the chromatograms, but that's what I can make out.

Q. The next column is "Graph Reading." What's the distinction between reading and graph reading?

A. One can be a direct reading from the instrument and the other can be converting it to parts-per-billion or parts-per-million units.

Q. And the last column on the right refers to "Result," and, on this sheet, that's expressed in parts per billion; is that correct?

A. The last column is parts per million, PPM. Which

page are you looking at? My pages are not numbered.

Q. I was looking at the one for the first sample.

A. Okay. This one is PPB, yes.

Q. All right. And, then, in the second, third and fourth samples, the results are expressed in parts per million; is that correct?

A. Right.

Q. Any reason why the first one was expressed in parts per billion?

A. It's basically the same unit. You are just moving the decimal point one way or the other, and the analyst just didn't write or like to write too many zeros.

Q. Now, the next three rows, with respect to sample 1, there's some information written in there and then there's a line drawn through the entire row. Do you know why that was done?

A. No, I couldn't explain it to you right now, no. One was, looks like, reagent blank, and the other was a spike.

Q. Now, what's a spike?

A. When, to a soil sample, we add a known amount of chlorsulfuron and then carrying it through the various analytical procedure -- including instrumentation -- to find out is it working, what we are using is working, what our percent recovery is for that sample.

Q. In other words, you take a clean soil sample and add --

A. A given.

Q. -- the chemical to it; is that what the spike is referred to?

A. Yes, yes.

Q. And then you run that through the chromatography process just to see how that compares with the sample?

A. The extraction, the whole thing, the whole thing, just like an unknown.

Q. All right. In the spike row, the column under "Claim" has a number there, .036 milligrams?

A. Micrograms.

Q. Or micrograms, all right.

Does that refer to the quantity of chemical used in the spike?

A. I believe that's what the indication was.

Q. And the result there shows -- what -- none?

A. That's what it says, yes.

Q. And the technician's notes in the Reading and Graph Reading columns say, "Appears to be something there, can't measure"; is that correct?

A. Correct, that's what it says.

Q. Now, what does that mean to you, that that's what is reported there?

A. That the individual had a problem with that sample, the spike sample, couldn't determine if an actual compound is present or not; therefore, he had to repeat it.

Q. Since a known quantity of the compound was put in the spike process -- .036 micrograms -- what should be the result in parts per million or billion when you start with a known quantity? Isn't that something that can be calculated?

A. It can be calculated; and, if you look down on the same page, basically, after note 2, as the analyst indicates, "No spike recovery above: repeat run," then the analyst repeats it; and, under -4, which is spiked in that case, the sample, we got 56 percent recovery.

Q. Does that mean 56 percent of the recovery of the known quantity that was put in?

A. Yes, yes.

Q. So, then, apparently, the analysis process does not recover all of the chemical?

A. Very seldom it does.

Q. All right. Is that spike result used to adjust the findings in the samples?

A. No. We do not report it. What we find we also report what is our spike recovery. I believe, on the actual report sent out, it indicates, "Sample numbers 1 and 3 were run in duplicate with good agreement. Reagent blanks

carried through the procedure showed no Chlorsulfuron. Spike recovery for fortified samples - carried through the analytical method - were 56% and 70%."

Q. Now, how does the recovery, the spike recovery percentages, affect the findings on the samples, if it does?

A. I'm not sure if I am following your question. I'm sorry.

Q. Well, does it mean, for example, that, in sample number 1, that the .0041 parts per million were possibly only 70 percent of the amount that was in there?

A. Right, possible. When you say "possible," right.

Q. You have the spike recovery percentages and the actual findings in the sample. If you were going to determine how much Glean was in that particular sample, would you factor that in? How would you draw a conclusion in that regard?

A. That one is depending on the purpose, what you want to do; and, for the purpose of what you are describing here, you could factor it in, yes, which would increase the volume of the chlorsulfuron found. Those would be an additional 30 percent or I think you mentioned 70.

Q. You said it's possible. I guess, how certain is the accuracy of the spike recovery process in terms of adjusting your findings?

A. The report is very nicely demonstrating here. In one case, we have got 56 percent, in the other case, 70 percent, so it's not the actual volume, not the same every time. That's your question.

Q. Well, in order to utilize the findings from the samples, is it necessary to factor in the recovery percentage or you said --

A. Not necessary, no.

Q. All right.

A. Not necessary, no.

Q. So the fact that the spike recovery percentages were as indicated does not necessarily mean that you have to factor up the Glean finding by a factor of 30 percent or more?

A. We do not, we do not. Some people like to do that, but we don't.

Q. Now, still on page 10 with the run number I -- is that the word "run number I"?

A. Run I.

Q. Okay. Under note number 2, there in the second line, it says, "Also had to reshoot entire string cuz of problems with instrument." Is that because the reagent -- well, do you know what the problem with the instrument was and why they had to reshoot?

A. I don't know the specific problem, but, in a

general way, describing the Glean analysis, chlorsulfuron is a very touchy analytical technique, to say the least. We are talking a very low amount of the chemical both put on, if it's applied by label direction, and, then, of course, finding as we found it here. That's why in many cases we're talking of parts per billion versus parts per million.

The instrumentation -- the high-pressure liquid chromatography, the specific detector, what is being used for the analysis, is very delicate and it takes a considerable amount of time to stabilize everything on the instrument before it is performing to specifications. It usually happens for the first run, we are going to have to repeat it because we are just tuning, fine tuning, in our instruments; and, therefore, the reports counting as run II and later other runs.

Q. All right. So run II analyzed samples number -3 and -4?

A. And 4 spike.

Q. Now, again, 4 spike, why is that 4 spike? I mean, does that refer to the fourth soil sample?

A. Yes, which is being spiked.

Q. So it's in addition.

Okay. The fourth soil sample was indicated as an unsprayed area; is that correct?

A. Correct. We also analyzed a three-fourths spike -4 and it's reconfirming that we do not see any Glean in that soil; and we also spiked it with a known quantity of the chlorsulfuron to find out what is the percent recovery of ours.

We prefer, if we receive from the field, a field blank because the soil conditions can be different in Manhattan versus Billings and/or Glasgow, so we don't like to just take a laboratory soil; we like to have from that general region or area a field blank. We confirm that there is no chemical present and then we can do the spike recovery because the spike recovery and the extraction of a compound makes a big difference what type of soil you are talking about.

Q. So, there, you have a uniform soil and the actual soil sample for that purpose?

A. That is our hope.

Q. On run number III on the next page, which on the exhibit is page 11, you repeated a run on the first sample; is that correct?

A. Right. "1R" stands for repeat, exactly; a new portion of that sample.

Q. A new sample from the soil sample?

A. Yes.

Q. All right. Now, on both run I and run III, with

respect to sample number 1, were there two readings taken and then they are averaged; is that how that's done?

A. Two readings between the first run and the third run?

Q. No. I'm looking at the first row on run I which shows, it looks like, two readings and an average is taken.

A. More than one injection.

Q. Okay.

A. More than one injection of that one milliliter of sample solution into the instrument, yes. We're trying to average it then, and also we are checking it if our injection is repeating itself correctly by using a microsyringe, which can produce error, trying to eliminate that error by multiple injections.

Q. Now, am I correct that that soil sample number 2 was only run once on run number III?

A. Run number III is correct.

Q. And soil sample 2 was not run other than on run number III?

A. I believe that is correct, yes. We repeated -- our duplicate analysis, two separate analyses, in the report indicated was number 1 and number 3.

Q. Right.

A. That's what we had done.

Q. It looks like 4 was run twice, in run number II and

run number III?

A. Four is a field blank.

Q. All right. That's true.

A. That's our control, and we are trying to run as much blank just to show ourselves that we are not cross-contaminating the string of samples in our own laboratory.

Q. Why would the spike recovery on the spiked sample 4 vary so much between 56 and 70 percent on the two runs?

A. There's a number of possible reasons.

Q. I see that the amount of the spike -- or the chemical put into the spike was different on each one.

A. Right.

Q. Would that be a factor?

A. That can be a factor also. The higher the quantity, it's easier to track, especially, this type of a compound. The lower the quantity, the more difficult, including spike as well as the final results in an unknown sample.

Q. So the higher the --

A. Amount.

Q. -- quantity, the greater the recovery percentage?

A. Your chances are better to recover, yes.

Q. Now, I notice, for example, that the results reported for soil sample number 1, on the first run, there was a finding of 3.68 parts per billion or .00368 --

A. 00368.

Q. -- parts per million?

A. Mm-hmm.

Q. And, on run number III, the result was .0041 parts per million. Why is the higher amount the one that is put on the final report?

A. There are two reasons for it: The number one reason, the first one was a troublesome run, as indicated by the analyst's note. Run III was much better; everything was functioning as specs, instrumentation, and, then, we are reporting out based on dry-weight basis. This 50 grams was as is taken out of the container.

The following worksheet shows moisture determination in the soil, which is not very much in -1. The first sample was 9.3 percent, almost 10 percent.

Q. And how does that affect the result?

A. If you take the moisture out of the ten percent, it's increasing the volume because it's on a dry-weight basis.

Q. Dry weight?

A. Dry-weight basis; I believe it's indicated on the report.

Q. Yes, it is.

Now, the sample number 3 was repeated, run twice?

A. Yes.

Q. And, again, the result on run number II -- which

was the first time sample number 3 was run -- was .00078 parts per million, and, in run IV, sample 3 produced a result of .00066 parts per million, and, again, the higher amount was reported on the final report. Why?

A. Same reason; just the analyst's observation, instrumentation and everything else was running much better on the second time than the first time.

If it would have been a regulatory type of chain of custody required and documentation, we would have reported both.

Q. Well, you're reporting both today.

If this would have been a regulatory request for analysis and a chain of custody request, would the analysis have been performed any differently or would there have been more runs or anything like that?

A. Not the analysis, but the handling of the samples and documentations would have been completely different.

Q. All right. I noticed on a note after run number IV, it says, "No problems in laboratory" -- this is note 2 -- "Poor baseline: need to reshoot samples." What does that mean?

A. No problem in the laboratory, there was no spillage during the extraction or concentration. Poor baseline is when the detector is sending signals to the chart paper and it's drifting, and, again, it's a problem where you have to

condition the instrument longer and then reshoot the samples.

Q. Now, this is run number IV. It says, "Need to reshoot samples." Apparently the samples were not reshot; is that correct?

A. I wouldn't say that's not correct or correct. It's not here, but we had most of our paperwork -- all of the chart papers and everything else -- separately. I just happened to find these; that's all that's left.

Q. But at least, based on what you could find, it doesn't indicate that the samples were reshot?

A. No, I would say it was reshot, based on that, because if the analyst says it should be reshot, then it should be, and the individual makes the decision to do it.

Q. Now, the reshooting, is that the same thing as another run?

A. No, other reinjection, other reinjection, and it very well could be one of these data right here which we are seeing.

Q. You think maybe the second line of the finding might be a reshoot?

A. Right, it is a reshoot, but I'm not sure. What I'm not sure about is is that a reshoot because of that statement or for some other reason, but it is a reshoot.

Q. I see. Now, is the moisture determination made by simply drying the soil?

A. Correct, the drying of it.

Q. And is that done so that the dry weight of the soil, then, can be used to --

A. Everything is on a common denominator.

Q. All right. Does the amount of moisture in the soil affect any other aspect of the analysis process?

A. Not for this compound.

Q. Did David Quist tell you what his sampling technique was or what he was trying to do; in other words, measure a composite average or in a specific location or any of that?

A. I don't remember. I don't remember if we even talked about it and what was that; I just don't remember.

Q. If you were going to design a test -- including the sampling procedure -- to determine how much Glean was in a field for the purpose of analyzing the potential effect of that Glean on crops, how would you do that? What kind of sample would you take?

A. To design a sampling scheme to show if there is possible damage to a given crop?

Q. Well, if you were going to determine whether there was enough Glean in a field to damage a crop that might be planted in there in the future, how would you determine that? In other words, what I'm trying to find out, ultimately, is these parts per million findings are of

what significance in terms of the real world out in the Folkvord's field?

A. I cannot tell you that, I'm sorry. I wish I could, but . . . .

Q. What would you need to know before you could convert these parts per million into something that's meaningful in the real world? You'd have to know about the testing procedure, would you not?

A. First of all, I would design an experimentation where, in a greenhouse situation or a very controlled field condition, a known amount of Glean is in the soil and I put the crop in and make the observation. So I would make the design for sampling and doing analytical work on the soil, then make the seeding, make the observation and try to put together at different levels of the Glean in different plots so I have some kind of a curve to show me that, at one level, at a given PPM, it's become harmful to that plant under those conditions. You would have to show a number of characteristics of that soil: PH, moisture conditions and so forth.

Q. Well, what do these findings in your report, then, tell us about the amount of Glean in the fields that were sampled?

A. What we are really saying there is that compound in that soil sample is present about that level and nothing

more, to me, but I'm not -- I'm only an analytical chemist and nothing else.

Q. So all you're able to say is that, in the sample that you were provided, there were this many parts per million of Glean in it?

A. Correct.

Q. And, based on the information you have about the sampling, are you able to tell us anything about the significance of that finding; I mean, how much Glean that is per acre or per ton or . . . .

A. You can make calculations, you know, per ton or what have you.

Q. Are you able to convert the parts per million findings into, let's say, ounces per acre?

A. Sure, you can make that calculation; it's possible. You're not going to have more meaningful information based on that either. You don't know a given soil's density, what is it weighing -- each soil is different -- are you talking of the first two millimeters of the soil or the first two centimeters or the first two meters.

Q. The depth of the sample would be an important thing to know, wouldn't it, if you were going to try to analyze or try to analyze the significance of those findings, or wouldn't it be?

A. Yes, that is important to know, and we want to go

close to the root zone of that crop when we are sampling, or down to, because that's where that plant can be taking up that pesticide.

Q. Now, this, to your knowledge, was not a soil profile sample, was it?

A. No; I'm sorry. I wasn't there. I don't remember our discussions with Dave, if it was any related to sampling.

Q. All right.

A. The man, I think he was saying that he was out with the DuPont representative -- somebody -- and probably it was a split sample. I'm not sure now if it was this case or somebody else's case. I'm sorry. No, I don't know.

Q. Have you ever had your deposition taken before?

A. Yes.

Q. How many times?

A. A couple of times.

Q. Have you ever had your deposition taken before in a pesticide case?

A. Once.

Q. Okay. And when, approximately?

A. Oh, I don't remember now. It was more -- well, wait a minute. I take that back. What do you mean, a deposition like this?

Q. Either a deposition or testify in court.

A. In what you call an administrative hearing is what I'm referring to, which is from the regulatory side.

Q. Okay. And what was the nature of the proceeding that you testified in?

A. One that I remember was Endrin, a chlorinated insecticide.

Q. Have you ever testified in any proceeding or in any deposition about Glean before?

A. Glean, no.

Q. Is there some kind of a calculation by which you can convert parts per million into, let's say, ounces per acre?

A. Not reliable, no, because acre is not a weight unit; it's an area. Parts per million is a weight unit -- one part or pound in a million pound or one gram in a million gram.

Q. So you'd have to know the weight --

A. Density.

Q. -- density of the soil so that you'd know what the weight per acre was; is that correct?

A. Right; then you can convert, yes.

Q. Okay.

A. Then you can convert.

Q. Are you aware of any rules of thumb or general assumptions about weight of soil by which you can convert

ounces to acres?

A. There are a number of them around.

Q. Well, are there any that you subscribe to?

A. No.

Q. Give me some examples of the ones that are around.

A. I don't remember the weights but I don't like them, so I even block them out purposely. I have a difficulty with the soil scientists on that when it comes to pesticides. For the purposes of fertilization, it's probably okay.

Q. In other words, there are some rules of thumb, at least, that you're aware other people use that would convert an acre of land into so many --

A. Pounds.

Q. -- pounds of soil at a certain depth?

A. At a certain depth, correct, yes.

Q. I've heard one that an acre of land three inches deep is a million pounds of soil. Have you ever heard that one?

A. Heard it, yes.

Q. Okay. You don't utilize those kinds of conversions?

A. No.

Q. Is that because the density of the soil is a variable?

A. Variables, and just a general pitfall. When you are talking such a low quantity of pesticides and you're going to a large quantity of the soil, you can run into all sorts of problems. When you're talking of just nitrogen fetilizer needs in a soil, that's different and perhaps it's very useful for those kind of statements.

Q. Well, you said that you have run other chlorsulfuron analyses in the lab, and I guess what I'd like to know is whether -- based on your previous lab work and your knowledge about Glean, generally -- whether these findings are significant in any way. I mean, what do they mean to you in terms of how much Glean is in there?

A. I think I'm out of my own expertise there, by all means. It certainly means it's there, it is disturbing to me it's there, but I have no explanation why is it there and/or what does that significantly mean. Knowing, you know, multiple applications you are indicating; therefore, maybe I shouldn't be surprised at that, but I'm out of my own domain here.

Q. Okay. So you're not able to tell us what the significance of these parts per million findings is in terms of either converting it to ounces per acre or drawing any conclusions about the effect of that quantity on crop?

A. That's correct. That's not my area of expertise.

Q. And you don't know the depth from which the

samples were taken?

A. Correct.

Q. Which would be significant for some purposes I think, wouldn't it?

A. Some purposes, yes.

Q. Does the fact that the moisture found in sample 3 -- for example, 6.4 percent was less than the 9.1 and 9.3 percent of moisture found in the other two samples -- mean anything in terms of the results?

A. No. That's why we want to calculate the dry weight base so everything is in a common denominator.

MR. CASHMORE: Okay. I wonder if we could take just a couple of minutes break and I'll confer with Rod and then we'll finish up.

(Whereupon, a break was then taken.)

BY MR. CASHMORE:

Q. I think you testified something about leaching analysis, and that would be a soil profile, I guess, to determine how much was at different depths. Have you ever performed that kind of analysis for Glean or chlorsulfuron?

A. Not that I know of, not that I know of.

Q. In other words, if someone brought you something like that you didn't know that's what it was for?

A. Right, right.

Q. Okay. How would you characterize the percentage of moisture found in these particular soil samples as, you know, great or small?

A. About average for that time of the year.

Q. Nine percent?

A. Six to ten percent, twelve percent. It just depends on a rainfall the day before makes a difference.

Q. Okay. I asked you earlier that, if you were going to take a sample from one acre, that you might use the "W", which would be five samples.

If you were going to determine a composite average for, let's say, a 40-acre field, how large a sample would you have to take for that, do you think?

A. Well, the other factor, what I also should have pointed out, on sampling will be dictated also the available fund. If unlimited funds are available and we have all the people to do the sampling and the analyses -- the whole 40 acres should be analyzed, ideally; that's an ideal situation but not practical -- I still would follow the "W" shape for average, and I would go seven to five points.

Q. Seventy-five points?

A. Seven to five or five to seven, depending.

Q. All right.

A. It also would dictate how much hilly country, flat country, the slope of the -- a number of other factors

involved that would have to be made decisions right on the spot.

Q. Other than the testing that was done in your lab, do you have any other knowledge concerning the Folkvord's experience with Glean? Have you done any other analysis or become involved in the case in any way that you know of?

A. Not to my knowledge.

Q. You don't have any opinions concerning -- expert opinions -- concerning whether Glean may or may not have damaged Folkvord's crops, any of that?

A. I haven't even seen the field.

Q. All right. Do you have an opinion whether the findings of chlorsulfuron, expressed in parts per million in your report, are of a sufficient quantity to damage crops?

A. No, I do not.

MR. BRAAKSMA: You do not have an opinion on that?

THE WITNESS: I do not have an opinion. I have a personal opinion as far as not disturbing this data, but I'm a little bit conservative. Whenever chemicals are around, I'm confused.

BY MR. CASHMORE:

Q. You haven't formed an expert opinion, as a chemist, whether the findings of chlorsulfuron in your report would

or would not have an effect on growing crops; is that correct?

A. That is correct. I'm still waiting for various research sources to show me that.

Q. What research sources are you talking about?

A. Well, the registration itself of the compound, which is coming from DuPont, the actual field application and observation of plant and soil scientists as well as growers. I think the verdict is still kind of out on that, and, I think, most of all is the use and/or misuse of the chemical, of any chemical.

Q. You said that you have kind of a concern about the findings. What is that concern?

A. It is a personal concern whenever we are finding some chemical in an agricultural product such as soil or a crop, but nothing else, just personal concern.

Q. Okay. Have you pursued that concern by studying the chemical itself, whether it's toxic, what effects it has on crops, those kinds of things?

A. In an indirect way. Dr. Zahnow at DuPont, we are in frequent discussion about this type -- this is a new type of a compound. It's new certainly for the analytical laboratories, I believe it's new for the applicators, new for our growers, and it's new for our scientists of soil and plant. And, everytime there is a new compound coming

out, there's a lot to learn, and I think we are still in the process -- including DuPont -- to gather all of the information. It's a new approach when we are applying such a small quantity of a chemical per acre and then trying to find that in the analytical scheme.

Q. Have you ever analyzed the plant samples for the purpose of determining the presence of Glean in them?

A. We never made it. We almost got, from the state of Washington, for carrots. No, excuse me, that was Oust, I beg your pardon. No.

Q. Have you been asked by the attorneys for Folkvord to testify in the case they've filed against DuPont on any other matters other than the lab report work itself?

A. No. I have not been contacted except for this case.

Q. Have you been asked by anyone to do any further analysis of your findings in the lab report or of any other aspect of the Folkvord's operation and chemical use?

A. Not to my knowledge.

Q. And, again, I'll show you Deposition Exhibit 16, and is that a true and correct copy of the lab report and supporting documents that you brought with you from your files?

A. That is correct.

Q. I noticed that there's another document in the file

folder that you have in front of you, inside of the file folder, I think. What is that?

A. This is our price list and policies and general information about the laboratory's operation and function and prices.

For this exhibit, I just would like to add, this is not all that we have had. This is what we have left.

Q. Have you looked through other records and been unable to find additional documents?

A. Because it's been disposed of.

Q. Okay. What kinds of things would have been disposed of?

A. Well, all of the chromatograms, all of the calculation sheets would have been disposed of.

Q. So all we have, then, is the summary --

A. Summary.

Q. -- of the data that's on those schedules that we talked about?

A. Correct.

MR. CASHMORE: All right. That's all I have.

EXAMINATION

BY MR. BRAAKSMA:

Q. I just have a couple of questions, Mr. Torma.

First of all, looking at Deposition Exhibit No. 16,

msu

AGRICULTURAL EXPERIMENT STATION
ANALYTICAL LABORATORY MC CALL HALL, CHEMISTRY

COLLEGE OF AGRICULTURE

MONTANA STATE UNIVERSITY, BOZEMAN 59717

March 30, 1987

COPY

Landoe, Brown, Planalp, Kommers, & Johnstone
Attn: J. Robert Planalp
Post Office Box One
27 North Tracy
Bozeman, MT 59715

Dear Mr. Planalp:

I received your letter of March 23, 1987 related to the scheduled litigation between Dale and Dean Folkvord against DuPont Company.

I attempted to speak with you by telephone, but unfortunately you were out of the office. I left a message for you to return my call, but to date I have not heard from you. It certainly would be beneficial both for my personal and work schedule if arrangements were made for my testimony. To the best of my recollection, I was not asked to testify at this trial nor was I asked to give a deposition. I was unaware that you even wanted a deposition until Mr. Braaksma contacted me. This deposition has already taken at least two hours of my time, and it appears that it will take even more time for me to review and correct it. Due to my tight work schedule, I request that you make specific arrangements, either by subpoena or give me time to ask for vacation leave in order to appear at the trial.

Sincerely yours,

Laszlo Torma

Laszlo Torma
Assistant Research Chemist

cw

Keep correspondence
with disposition.
But don't catalog
the correspondence.
Thanks

TELEPHONE (406) 994-3383

msu
COLLEGE OF AGRICULTURE

AGRICULTURAL EXPERIMENT STATION
ANALYTICAL LABORATORY MC CALL HALL, CHEMISTRY
MONTANA STATE UNIVERSITY, BOZEMAN 59717

COPY

March 30, 1987

Charles Fisher
Court Reporting
Attn: Abby Wass
221 East Mendenhall
Bozeman, MT 59715

Dear Ms. Wass:

I received the copy of my deposition today. Due to my very tight schedule, I hope to complete the review and correction of my deposition by the end of April.

My first name is misspelled and I request that it be corrected. The correct spelling of my first name is:

Laszlo

Sincerely yours,

Laszlo Torma
Assistant Research Chemist

cw

TELEPHONE (406) 994-3383

LAW OFFICES OF
LANDOE, BROWN, PLANALP, KOMMERS & JOHNSTONE, P.C.
POST OFFICE BOX ONE
27 NORTH TRACY
BOZEMAN, MONTANA 59771-0001

HJALMAR B. LANDOE
GENE I. BROWN
J. ROBERT PLANALP
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JAMES A. JOHNSTONE
CALVIN L. BRAAKSMA
MARJORIE BLACK

TELEPHONE (406) 586-4351

March 23, 1987

~~COPY~~

Mr. Laszlo Torma
Montana State University
Bozeman, Montana 59717

RE: Folkvord v. DuPont

Dear Mr. Torma:

As you have been previously informed, our clients, Dale and Dean Folkvord, are involved in litigation against DuPont Company, which trial is scheduled to commence in Bozeman on April 7, 1987.

We have been informed that you could provide testimony that would help the Folkvords. The purpose of this letter is to inform you of the trial date and to ask that you contact me regarding your availability for the trial.

I would imagine your testimony would run for a very short period of time and would be on either April 8, 9 or 10, 1987.

Please contact me at your earliest convenience upon receipt of this letter to confirm your availability for the trial.

Very truly yours,

J. Robert Planalp (cm)

J. Robert Planalp

JRP/cm

Called, not in, will be back on Th.
Left a note to call me back
3/25/87

RECEIVED
MAR 24 1987
DEPARTMENT OF AGRICULTURE
LABORATORY BUREAU

CHARLES D. FISHER
ABBY WASS
LINDA KLAPPER
YVONNE MADSEN

CHARLES FISHER
COURT REPORTING
221 EAST MENDENHALL
BOZEMAN, MONTANA 59715

(406) 587-9016

DEPOSITIONS
ARBITRATIONS
HEARINGS
VIDEO SERVICES

March 24, 1987

Mr. Lazlo Torma
Chemistry Station -
Analytical Lab
McCall Hall
Montana State University
Agricultural Experiment Station
Bozeman, Montana 59715

Re: Dale Folkvord, et al. vs. E. I. DuPont
DeNemours and Company

Dear Mr. Torma:

Enclosed is your copy along with the original signature page of your deposition taken on March 12, 1987.

Please read your copy of your deposition and sign the original signature page before a Notary Public, then return the original signature page to me within thirty (30) days of the date hereon.

A correction sheet is also enclosed. If there are any corrections, please fill out the form and return along with the original signature page.

Truly yours,

Abby Wass

Abby Wass
Court Reporter

AW/lm
Enclosures

RECEIVED
MAR 30 1987
EPARTMENT OF AGRICULTUR
ABORATORY BUREAU

DEPONENT'S CERTIFICATE

I, LAZLO TORMA, the deponent in the foregoing deposition, DO HEREBY CERTIFY, that I have read the foregoing -49- pages of typewritten material and that the same is, with any changes thereon made in ink on the correction sheet and signed by me, a full, true and correct transcript of my oral deposition given at the time and place hereinbefore mentioned.

____
LAZLO TORMA

SUBSCRIBED AND SWORN TO before me, this ______ day of ___________________, 1987.

____
NOTARY PUBLIC

PLEASE MAKE ALL CHANGES FOR CORRECTIONS ON THIS SHEET SHOWING PAGE, LINE AND CORRECTION FOR COURT REPORTER'S INSERTION INTO THE ORIGINAL DEPOSITION. SIGN THIS SHEET, SIGN THE SIGNATURE PAGE BEFORE A NOTARY PUBLIC; AND RETURN TO THE COURT REPORTER FOR FILING WITH THE CLERK OF COURT. IF THERE ARE NO CORRECTIONS, PLEASE WRITE "NO CORRECTIONS" ACROSS THIS SHEET AND SIGN AT THE BOTTOM OF THE PAGE.

SIGN HERE AND ON DEPOSITION

NOTARY PUBLIC

ONTANA 1981

Wared	Wal-dron	Wam-pum	Other & Unknown	TOTAL
--	.1	--	4.6	10.0
--	--	--	2.1	91.2
11.2	--	3.0	5.7	200.0
--	--	.1	14.3	118.0
--	2.5	.1	8.3	244.6
.3	--	--	2.5	132.0
.3	--	--	11.2	114.5
4.3	--	2.0	2.0	61.4
--	--	12.0	1.6	64.8
--	--	.1	7.0	161.5
16.1	2.5	17.3	54.7	1,188.0
--	8.0	1.5	23.1	220.6
--	--	--	19.7	142.5
--	--	--	10.5	68.9
--	--	--	7.0	133.3
30.2	--	--	14.0	122.3
--	7.7	1.5	10.1	275.7
--	7.3	--	4.1	81.7
--	1.2	14.2	37.6	285.0
30.2	24.2	17.2	126.1	1,330.0
2.6	--	2.2	2.9	63.7
--	--	.3	.4	21.6
--	--	--	.1	11.4
--	--	.3	2.7	28.3
2.6	--	2.8	6.1	125.0
--	--	--	10.3	16.0
--	--	3.2	11.4	26.0
--	8.3	--	10.9	50.2
.7	5.6	--	13.5	57.9
--	--	--	6.6	46.9
.7	13.9	--	31.0	155.0
49.6	40.7	40.5	244.2	2,850.0

WINTER WHEAT

State	Acreage seeded 1/				Production		
	Crop of 1971	Crop of 1972	Crop of 1973	Crop of 1973 as percent of crop of 1972	Crop of 1971	Crop of 1972	Crop of 1973 2/
	1,000 acres			Percent	1,000 bushels		
N. Y.	119	[illegible]	163	[illegible]	4,218	5,180	6,048
N. J.	38	[illegible]	50	114	1,457	1,330	1.650
Pa.	271	290	296	102	9,396	8,608	10,360
Ohio	967	1,064	702	66	41,536	46,305	25,272
Ind.	736	801	740	83	31,924	39,648	25,900
Ill.	1,045	1,265	1,240	98	46,000	54,000	50,240
Mich.	513	601	585	97	17,820	21,400	20,475
Wis.	23	32	23	72	924	640	805

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WINTER WHEAT

1974 CROP

STATE DOCUMENTS
DEC 31 1973

MONTANA CROP AND LIVESTOCK REPORTING SERVICE
P. O. Box 1726 - Helena, Montana 59601

Released: December 26, 1973

MONTANA

An estimated 2.6 million acres of Montana's cropland has been seeded to winter wheat this fall according to the Montana Crop and Livestock Reporting Service. This is an increase of 18 percent from the 1973 seeded acreage. Only in the years 1965, 1967, and 1968 has the acreage been larger.

December 1 conditions reported by growers indicate a 1974 winter wheat crop of 72.5 million bushels--32 percent more than 1973. Actual harvested acreage and production will depend on the effect of weather, disease, insects, and other factors between now and the 1974 harvest.

Seeding began in early September and was completed by late October. Germination ranged from poor in parts of the northwest to good in most other areas. Moisture was received in the form of snowfall early in November which contributed to the generally good crop condition by the first of December.

UNITED STATES

*** Farmers seeded 51.0 million acres of winter wheat in fall 1973 for harvest in 1974. That totals 18 percent more than for the 1973 crop and is the largest acreage since the 1967 crop. Prospects of continued favorable wheat prices along with a modified farm program which requires no set-aside acreage were chiefly behind the increased acreage.

*** All States except two minor wheat growing States seeded more acres than a year earlier. States east of the Mississippi registered sharp increases from fall 1972. Wheat growers in the Great Plains also seeded considerably more acres. Texas and South Dakota acreage is up about one-fourth and Kansas and Oklahoma show 11 and 13 percent increases, respectively. Montana, Idaho and Oregon growers seeded from 10 to 18 percent more wheat. While Washington seeded only 3 percent more, this was the highest Washington acreage on record.

*** The 1974 prospective winter wheat crop, based on conditions as of December 1, is a record 1,513 million bushels. This would be 19 percent above 1973, the previous record, and 28 percent above the 1972 crop.

*** Yield per seeded acre at 29.7 bushels is 0.3 bushel above the 1973 crop and has been exceeded only by the 1971 average of 30.1 bushels. December 1 conditions indicate that 89.1 percent of the seeded acreage will be harvested for grain. This is up slightly from the 1973 percentage of 89.0 and the highest since the 1966 crop.

*** Wet weather generally delayed seeding in the Great Plains. Kansas growers had only two-thirds of their wheat acreage in the ground by October 21 compared with virtually all seeded by that date the previous year and the average of 95 percent. Seeding was not complete until after mid-November.

*** Above average November precipitation brightened prospects in Montana and the Pacific Northwest. This partially restored earlier moisture deficiencies which plagued growers throughout the 1973 season.

*** In the past decade, changes from the December 1 forecast to the final estimate have averaged 49 million bushels, ranging from 2 million to 106 million bushels. In those 10 years, the December 1 forecast was above the final estimate five times with an average of 46 million and below five times with an average of 52 million bushels.

Statistical Reporting Service
U.S. DEPARTMENT OF AGRICULTURE

MONTANA DEPARTMENT OF AGRICULTURE

WINTER WHEAT

STATE	ACREAGE SEEDED 1/ CROP OF 1972	CROP OF 1973	CROP OF 1974	CROP OF 1974 AS PERCENT OF CROP OF 1973	PRODUCTION CROP OF 1972	CROP OF 1973	CROP OF 1974 2/
		1,000 ACRES		PERCENT		1,000 BUSHELS	
N. Y.	154	151	220	146	5,180	5,040	7,920
N. J.	44	50	60	120	1,330	1,368	1,860
PA.	290	276	360	130	8,608	7,392	11,520
OHIO	1,064	755	1,550	205	46,305	23,040	62,000
IND.	891	740	1,440	195	39,648	24,605	61,920
ILL.	1,265	1,350	1,750	130	54,000	37,800	71,750
MICH.	601	585	910	156	21,400	19,880	33,670
WIS.	32	17	57	335	640	560	2,223
MINN.	29	36	42	117	780	1,184	1,218
IOWA	37	33	31	94	1,238	837	992
MO.	1,075	980	1,200	122	36,075	25,500	38,400
N. DAK.	73	80	130	163	2,178	2,336	3,770
S. DAK.	801	793	990	125	25,380	21,312	32,670
NEBR.	2,742	2,800	2,930	105	92,833	93,800	99,620
KANS.	10,300	10,800	12,000	111	314,900	384,800	360,000
DEL.	27	29	35	121	825	910	1,190
MD.	123	125	150	120	3,850	3,944	5,100
VA.	250	195	280	144	8,066	6,475	10,640
W. VA.	18	17	21	124	490	372	588
N. C.	250	200	260	130	6,200	5,600	7,800
S. C.	155	120	180	150	2,720	2,525	5,220
GA.	225	165	215	130	2,800	3,240	5,375
FLA.	70	55	52	95	630	660	1,300
KY.	301	241	460	191	7,020	5,412	12,420
TENN.	296	207	350	169	7,680	4,464	9,800
ALA.	161	140	185	132	2,200	2,024	3,700
MISS.	189	135	195	144	4,960	2,700	5,070
ARK.	361	305	336	110	10,952	6,076	9,744
LA.	75	60	70	117	690	396	840
OKLA.	5,700	6,000	6,800	113	89,700	157,800	149,600
TEXAS	4,050	4,600	5,600	122	44,000	98,600	78,400
MONT.	2,143	2,200	2,590	118	48,330	55,120	72,520
IDAHO	841	900	1,060	118	34,740	32,760	45,580
WYO.	255	250	260	104	7,700	5,267	7,280
COLO.	2,449	2,520	2,620	104	51,600	58,800	55,020
N. MEX.	378	390	411	105	4,335	8,526	5,343
ARIZ.	189	236	259	110	11,390	15,120	16,058
UTAH	218	235	259	110	5,433	4,968	6,475
NEV.	8	9	11	122	525	560	748
WASH.	2,621	2,730	2,800	103	119,520	74,200	126,000
OREG.	863	1,020	1,120	110	35,190	32,900	44,800
CALIF.	552	625	794	127	23,184	30,780	37,318
U. S.	42,166	43,155	51,043	118.3	1,185,225	1,269,653	1,513,462

1/ TOTAL ACREAGE SEEDED FOR ALL PURPOSES. 2/ INDICATED DECEMBER 1, 1973.

Daniel L. Herbert,
Agr. Statistician-in-Charge

Loren D. Nordhausen,
Agr. Statistician

UNITED STATES DEPARTMENT OF AGRICULTURE
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Montana Crop and Livestock Reporting Service

UNITED STATES DEPARTMENT OF AGRICULTURE
Statistical Reporting Service
and
MONTANA DEPARTMENT OF AGRICULTURE
Agricultural Statistics

Helena, Montana

Released
December 27, 1972

WINTER WHEAT - 1973 CROP

MONTANA

Montana winter wheat seedings this fall are estimated at 2.2 million acres, slightly above last year according to the Montana Crop and Livestock Reporting Service in Helena. However, production prospects are well above the 1972 crop outturn because of improved fall moisture conditions. A 1973 winter wheat crop of 60.8 million bushels is expected based upon December 1 conditions, 26 percent more than this year's crop of 48.3 million bushels. Actual acreage harvested and production will depend upon weather, disease, and other factors between now and 1973 harvest time.

Late summer and fall rains provided generally good conditions for fall seeding, although there were some scattered moisture shortages throughout the fall, especially in the central region. Germination of winter wheat was mostly good although there were some poor to fair areas, particularly where seeded late. Winter wheat stands and stooling have been good. Wind damage to date has been limited and snowcover provided protection against early December low temperatures.

UNITED STATES

*** Fall seeding of winter wheat in 1972 for harvest in 1973 at 42.8 million acres is 1 percent more than the 1972 crop and 12 percent above the 1971 seeding. Most Great Plains and Western States seeded more acres than the previous year, but seedings were generally down in the eastern half of the country. Wet fields and late harvest of other crops delayed seeding in eastern areas, and some growers abandoned plans for further seeding of winter wheat.

*** The 1973 prospective winter wheat crop, based on conditions as of December 1, is a record 1,278 million bushels. This would be 8 percent more than the 1972 crop and 12 percent more than in 1971. Condition of the crop on December 1 was mostly good to excellent. The previous record high output of winter wheat was in 1968 when 1,218 million bushels were produced.

*** Yield per seeded acre at 29.9 bushels is 1.8 bushels above the 1972 crop but 0.2 bushel below 1971--the record high.

*** Seeding began in Kansas in early September with generally favorable soil moisture over the State. Progress was rapid in late September and two-thirds of the crop was in the ground by the end of the month compared with the normal of one-half seeded. October and early November rains brought uniform stands but cool temperatures slowed growth. Condition of wheat on December 1 was mostly good to excellent reflecting good stands, adequate rooting and ground cover with ample soil moisture in most areas.

*** Oklahoma growers had over nine-tenths of the State's acreage seeded by mid-October but dry soil delayed completion, mostly in the Southwest. Late October rains provided needed moisture but unusually heavy precipitation during November kept fields too wet to finish seeding. Some intended acreage had not yet been planted in mid-December.

*** Seeding of wheat in Texas was 96 percent complete on December 1- about 2 weeks behind last year's schedule. Cold, wet weather delayed further seeding and slowed growth of early stands. However, prospects were generally good because of ample moisture supplies.

Daniel L. Herbert,
Agr. Statistician-in-Charge

DelRoy J. Gneiting,
Agr. Statistician

WINTER WHEAT

State	Acreage seeded 1/				Production		
	Crop of 1971	Crop of 1972	Crop of 1973	Crop of 1973 as percent of crop of 1972	Crop of 1971	Crop of 1972	Crop of 1973 2/
	1,000 acres			Percent	1,000 bushels		
N. Y.	119	154	168	109	4,218	5,180	6,048
N. J.	38	44	50	114	1,457	1,330	1.650
Pa.	271	290	296	102	9,396	8,608	10,360
Ohio	967	1,064	702	66	41,536	46,305	25,272
Ind.	736	891	740	83	31,924	39,648	25,900
Ill.	1,045	1,265	1,240	98	46,000	54,000	50,840
Mich.	513	601	585	97	17,820	21,400	20,475
Wis.	23	32	23	72	924	640	805
Minn.	33	29	38	131	868	780	1,026
Iowa	40	37	33	89	1,386	1,233	1,023
Mo.	900	1,075	925	86	31,000	36,075	29,600
N. Dak.	72	73	80	110	1,800	2,178	2,240
S. Dak.	641	801	793	99	19,908	25,380	20,618
Nebr.	2,539	2,793	2,877	103	102,228	94,572	103,572
Kans.	9,593	10,300	10,600	103	312,605	314,900	339,200
Del.	27	27	29	107	1,075	825	986
Md.	118	123	125	102	4,320	3,850	4,125
Va.	236	250	235	94	9,020	8,066	8,695
W. Va.	16	18	18	100	455	490	486
N. C.	290	280	290	104	10,535	6,975	10,730
S. C.	134	155	120	77	4,788	2,720	3,960
Ga.	235	225	165	73	7,605	2,800	4,455
Fla.	77	70	55	79	1,800	630	1,375
Ky.	241	301	241	80	7,200	7,020	6,507
Tenn.	282	296	252	85	8,424	7,680	7,308
Ala.	164	161	161	100	3,480	2,052	3,220
Miss.	149	189	180	95	3,625	4,960	4,860
Ark.	307	361	340	94	8,096	10,952	10,200
La.	75	75	60	80	805	690	720
Okla.	5,050	5,700	6,000	105	72,000	89,700	126,000
Texas	3,512	4,050	4,400	109	31,416	44,000	70,400
MONT	1,913	2,143	2,170	101	54,810	48,330	60,760
Idaho	809	841	925	110	37,842	34,740	40,700
Wyo.	229	255	250	98	6,732	7,700	8,000
Colo.	2,344	2,449	2,430	99	59,080	51,144	55,890
N. Mex.	347	378	390	103	3,840	4,335	5,850
Ariz.	189	189	208	110	11,764	11,390	13,104
Utah	196	218	235	108	5,365	5,433	6,345
Nev.	8	8	9	113	525	525	603
Wash.	2,251	2,621	2.730	104	108,250	118,275	117,390
Oreg.	731	863	990	115	32,016	35,190	38,610
Calif.	600	552	635	115	26,226	23,184	27,940
U. S.	38,060	42,247	42,793	101.3	1,144,164	1,185,890	1,277,848

1/ Total acreage seeded for all purposes. 2/ Indicated December 1, 1972.

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WINTER WHEAT: SEEDED ACREAGE BY VARIETIES, DISTRICT AND SELECTED COUNTIES - MONTANA 1980

Dist. & Co.	Winalta	Cheyenne	Centurk	Warrior	Rough Rider	Norstar	Winoka	Nugaines	Gent	Sundance	Lancer	Itana	Other & Unknown	TOTAL
N. WEST	1.9	.4	--	--	--	--	--	11.1	--	--	--	--	11.7	25.1
Blaine	54.7	48.5	--	--	4.3	34.1	6.9	1.5	--	--	--	--	--	150.0
Chouteau	31.5	118.9	139.8	41.4	--	--	--	--	--	--	8.8	--	8.3	348.7
Glacier	11.9	--	.7	--	--	--	--	--	--	--	--	--	5.9	18.5
Hill	134.3	92.6	50.0	39.4	.3	7.1	14.0	--	--	3.1	--	--	4.3	345.1
Liberty	45.6	9.9	52.2	--	1.4	2.7	--	--	--	--	--	--	21.4	133.2
Phillips	17.2	5.4	7.7	1.4	--	--	.7	--	--	--	--	--	8.8	41.2
Pondera	22.0	10.2	44.4	.4	--	4.5	19.0	--	--	--	--	--	.1	100.6
Teton	3.7	28.2	44.5	2.6	--	1.6	5.0	--	--	--	--	--	3.6	89.2
Toole	69.9	--	40.7	--	--	4.9	--	--	--	--	--	--	--	115.5
N. CENTRAL	390.8	313.7	380.0	85.2	6.0	54.9	45.6	1.5	--	3.1	8.8	--	52.4	1,342.0
Dawson	14.8	--	--	--	36.2	--	--	--	--	--	--	--	--	51.0
Garfield	4.1	12.7	--	1.9	3.8	--	--	--	--	--	--	--	--	22.5
McCone	64.7	--	--	--	--	--	--	--	--	--	--	--	--	64.7
Richland	16.3	--	--	3.2	11.6	--	--	--	--	--	--	--	--	31.1
Roosevelt	7.9	--	--	--	5.0	--	.2	--	--	--	--	--	--	13.1
Valley	8.8	1.1	--	.5	5.6	--	.2	--	--	--	--	--	--	16.2
Other	1.8	.1	--	.1	1.2	--	--	--	--	--	--	--	.2	3.4
N. EAST	118.4	13.9	--	5.7	63.4	--	.4	--	--	--	--	--	.2	202.0
Cascade	1.4	44.8	65.2	2.8	--	1.9	--	--	--	--	3.6	--	7.4	127.1
Fergus	4.4	63.7	18.8	1.9	--	3.6	5.7	--	4.3	16.2	4.4	8.1	18.4	149.5
Golden Valley	--	9.8	2.5	--	--	--	--	4.8	--	--	--	--	4.9	22.0
Judith Basin	3.6	31.8	32.3	--	2.5	.3	--	--	--	--	--	--	1.0	71.5
Other	31.1	26.3	14.5	1.1	.1	--	.1	--	--	.3	.1	--	4.1	77.7
CENTRAL	40.5	176.4	133.3	5.8	2.6	5.8	5.8	4.8	4.3	16.5	8.1	8.1	35.8	447.8
Gallatin	10.0	.5	3.5	--	--	--	--	11.9	--	--	--	--	10.4	36.3
Other	1.8	6.3	.7	--	--	--	--	2.2	--	--	--	--	3.7	14.7
S. WEST	11.8	6.8	4.2	--	--	--	--	14.1	--	--	--	--	14.1	51.0
Big Horn	--	21.2	--	42.3	--	--	--	--	--	--	--	--	7.1	70.6
Carbon	2.4	6.0	3.8	1.3	--	--	.7	--	--	--	--	--	.1	14.3
Park	4.5	1.7	7.8	--	--	--	--	--	--	--	--	--	--	14.0
Stillwater	10.6	--	28.5	--	--	--	--	--	20.0	--	--	--	--	59.1
Yellowstone	--	65.4	15.5	--	--	--	--	--	--	--	--	7.9	.4	89.2
Other	.1	4.8	.1	4.9	--	--	--	--	--	--	--	--	1.9	11.8
S. CENTRAL	17.6	99.1	55.7	48.5	--	--	.7	--	20.0	--	--	7.9	9.5	259.0
Carter	18.4	--	--	--	27.6	--	--	--	--	--	--	--	--	46.0
Custer	1.1	5.5	25.8	1.5	.4	--	--	--	--	--	--	--	1.1	35.4
Fallon	33.9	--	--	--	6.8	--	--	--	--	--	--	--	--	40.7
Powder River	3.4	18.0	18.6	--	--	--	--	--	--	--	--	--	.4	40.4
Prairie	39.6	--	23.5	1.0	--	--	--	--	--	--	--	--	--	64.1
Rosebud	--	22.2	--	2.6	--	--	--	--	--	--	--	--	8.9	33.7
Wibaux	6.4	--	--	--	--	--	6.4	--	--	--	--	--	--	12.8
S. EAST	102.8	45.7	67.9	5.1	34.8	--	6.4	--	--	--	--	--	10.4	273.1
STATE	683.8	656.0	641.1	150.3	106.8	60.7	58.9	31.5	24.3	19.6	16.9	16.0	134.1	2,600.0

SPRING WHEAT (EXCLUDING DURUM)
SEEDED ACREAGE BY VARIETIES, DISTRICT & SELECTED COUNTIES - MONTANA 1980

District and County	For-tuna	Olaf	Pro-dax	Lew	New-ana	Tioga	That-cher	Butte	Wared	Nor-ana	Red River 68	Bounty 309	Other and Unknown	TOTAL
N. WEST	.1	--	.5	--	2.0	--	--	--	--	--	--	--	12.9	15.5
Blaine	22.0	3.2	--	--	53.9	15.6	--	--	--	--	--	--	--	94.7
Chouteau	107.9	2.2	--	34.4	4.2	--	6.4	2.2	25.8	14.2	--	--	6.9	204.2
Glacier	46.8	--	5.4	14.2	2.7	--	--	5.0	--	--	--	--	38.4	112.5
Hill	79.3	10.1	18.2	81.1	43.6	--	5.0	--	--	15.7	--	13.0	9.7	275.7
Liberty	36.9	--	60.1	18.8	--	--	--	--	6.9	9.3	--	--	.8	132.8
Phillips	5.7	25.9	24.1	.3	--	27.5	10.9	--	5.0	--	--	2.3	1.8	103.5
Pondera	21.8	1.3	3.9	4.8	2.3	--	--	--	11.7	--	--	--	2.0	47.8
Teton	35.5	14.3	1.5	1.0	--	--	--	--	--	6.5	--	--	.3	59.1
Toole	76.6	14.0	63.9	.4	6.6	4.8	--	--	--	--	--	--	--	166.3
N. CENTRAL	432.5	71.0	177.1	155.0	113.3	47.9	22.3	7.2	49.4	45.7	--	15.3	59.9	1,196.6
Daniels	65.0	15.0	18.4	29.8	--	20.0	--	17.6	--	5.2	20.4	.5	38.4	230.3
Dawson	3.6	71.6	10.7	--	25.8	--	5.9	9.7	--	--	--	--	9.3	136.6
Garfield	22.7	19.8	--	--	--	--	--	--	--	--	--	--	1.7	44.2
McCone	11.2	60.8	20.0	.9	--	3.0	19.2	--	--	--	--	--	3.1	118.2
Richland	--	47.8	--	8.7	19.9	--	--	--	18.8	--	--	--	19.8	115.0
Roosevelt	32.6	99.8	15.1	87.1	--	--	22.1	--	--	--	5.8	--	14.3	276.8
Sheridan	--	22.3	27.9	4.0	--	11.7	--	.5	--	--	16.9	--	35.9	119.2
Valley	35.0	57.0	12.8	--	--	97.3	29.8	59.9	--	--	--	--	10.0	301.8
N. EAST	170.1	394.1	104.9	130.5	45.7	132.0	77.0	87.7	18.8	5.2	43.1	.5	132.5	1,342.1
Cascade	2.6	8.6	2.3	--	31.5	--	--	--	5.2	8.3	--	--	10.2	68.7
Fergus	12.8	--	11.7	5.7	11.4	--	--	--	--	--	--	--	3.8	45.4
Judith Basin	8.2	--	--	--	1.9	--	--	--	--	--	--	--	18.7	28.8
Other	16.7	.4	4.6	.1	4.6	--	--	.1	--	5.1	--	--	28.6	60.2
CENTRAL	40.3	9.0	18.6	5.8	49.4	--	--	.1	5.2	13.4	--	--	61.3	203.1
S. WEST	2.4	--	4.2	--	3.2	--	--	--	--	.9	--	--	1.0	11.7
S. CENTRAL	5.3	--	3.5	1.9	4.2	--	--	--	--	--	--	--	25.5	40.4
Fallon	.3	21.2	--	--	--	--	--	--	--	4.6	--	--	6.0	32.1
Wibaux	1.4	--	--	.4	.6	--	--	--	2.5	--	--	--	24.0	28.9
Other	3.6	1.2	1.0	--	1.7	--	--	4.1	--	4.0	--	--	14.0	29.6
S. EAST	5.3	22.4	1.0	.4	2.3	--	--	4.1	2.5	8.6	--	--	44.0	90.6
STATE	656.0	496.5	309.8	293.6	220.1	179.9	99.3	99.1	75.9	73.8	43.1	15.8	337.1	2,900.0

[illegible] Varieties)

SPRING WHEAT (EXCLUDING DURUM)
SEEDED ACREAGE BY VARIETIES, DISTRICT & SELECTED COUNTIES - MONTANA 1981

District and County	Olaf	Pro-dax	New-ana	For-tuna	Lew	Solar	Tioga	Butte	Nor-ana	That-cher	Wared	Wal-dron	Wam-pum	Other & Unknown	TOTAL
N. WEST	--	--	4.7	--	--	.6	--	--	--	--	--	.1	--	4.6	10.0
Blaine	2.2	8.7	31.7	9.3	15.0	8.6	10.4	--	3.2	--	--	--	--	2.1	91.2
Chouteau	1.7	8.8	45.1	59.9	20.0	11.8	--	5.5	24.6	2.7	11.2	--	3.0	5.7	200.0
Glacier	--	11.8	9.7	27.6	26.7	4.0	--	2.8	21.0	--	--	--	.1	14.3	118.0
Hill	32.6	15.4	58.9	41.9	63.3	8.3	--	--	10.7	2.6	--	2.5	.1	8.3	244.6
Liberty	3.7	43.4	--	17.5	20.8	17.8	--	--	26.0	--	.3	--	--	2.5	132.0
Phillips	22.6	46.3	2.0	4.3	.1	--	23.0	--	--	4.7	.3	--	--	11.2	114.5
Pondera	2.3	11.9	11.3	9.1	8.2	10.3	--	--	--	--	4.3	--	2.0	2.0	61.4
Teton	13.5	1.0	5.1	25.6	.5	3.0	--	--	2.5	--	--	--	12.0	1.6	64.8
Toole	13.0	75.3	6.5	39.3	.2	7.8	1.7	10.6	--	--	--	--	.1	7.0	161.5
N. CENTRAL	91.6	222.6	170.3	234.5	154.8	71.6	35.1	18.9	88.0	10.0	16.1	2.5	17.3	54.7	1,188.0
Daniels	33.3	13.8	2.0	20.1	54.0	8.0	39.6	14.1	3.1	--	--	8.0	1.5	23.1	220.6
Dawson	51.5	9.0	45.5	.5	--	--	--	14.1	--	2.2	--	--	--	19.7	142.5
Garfield	33.3	--	16.6	8.5	--	--	--	--	--	--	--	--	--	10.5	68.9
McCone	35.4	21.1	26.1	2.6	3.8	14.8	1.0	.2	--	21.3	--	--	--	7.0	133.3
Richland	49.5	1.5	19.3	--	4.9	.2	--	2.5	--	.2	30.2	--	--	14.0	122.3
Roosevelt	67.6	28.3	24.3	14.2	54.6	31.2	6.0	5.6	--	24.6	--	7.7	1.5	10.1	275.7
Sheridan	10.7	19.7	1.5	1.0	9.0	14.6	5.9	7.9	--	--	--	7.3	--	4.1	81.7
Valley	35.2	23.0	2.4	14.0	28.0	7.2	71.0	33.9	2.5	14.8	--	1.2	14.2	37.6	285.0
N. EAST	316.5	116.4	137.7	60.9	154.3	76.0	123.5	78.3	5.6	63.1	30.2	24.2	17.2	126.1	1,330.0
Cascade	7.4	5.7	24.3	5.2	4.9	2.0	--	--	6.5	--	2.6	--	2.2	2.9	63.7
Fergus	--	6.6	6.4	4.4	2.1	1.4	--	--	--	--	--	--	.3	.4	21.6
Judith Basin	--	--	1.0	3.5	--	6.8	--	--	--	--	--	--	--	.1	11.4
Other	.2	5.5	8.9	6.1	.1	.8	--	--	3.7	--	--	--	.3	2.7	28.3
CENTRAL	7.6	17.8	40.6	19.2	7.1	11.0	--	--	10.2	--	2.6	--	2.8	6.1	125.0
S. WEST	--	1.4	2.8	1.0	--	--	--	--	.3	.2	--	--	--	10.3	16.0
S. CENTRAL	--	1.5	4.6	4.3	1.0	--	--	--	--	--	--	--	3.2	11.4	26.0
Fallon	8.5	1.7	--	.3	--	18.5	--	--	2.0	--	--	8.3	--	10.9	50.2
Wibaux	7.0	.6	.3	1.1	--	10.0	--	19.1	--	--	.7	5.6	--	13.5	57.9
Other	3.4	.8	1.1	21.6	--	5.8	--	3.0	4.6	--	--	--	--	6.6	46.9
S. EAST	18.9	3.1	1.4	23.0	--	34.3	--	22.1	6.6	--	.7	13.9	--	31.0	155.0
STATE	434.6	362.8	362.1	342.9	317.2	193.5	158.6	119.3	110.7	73.3	49.6	40.7	40.5	244.2	2,850.0

S
630.20112
A7ww
1981

WINTER WHEAT: SEEDED ACREAGE BY VARIETIES, DISTRICT AND SELECTED COUNTIES - MONTANA 1981

Dist. & Co.	Centurk	Winalta	Cheyenne	Norstar	Rough Rider	Warrior	Nugaines	Winoka	Rocky	Lancer	Wanser	Other & Unknown	TOTAL
N. WEST	1.7	--	.1	--	--	--	7.9	--	1.8	--	--	8.5	20.0
Blaine	--	15.0	18.0	50.0	1.2	5.2	3.5	3.4	--	--	--	1.6	97.9
Chouteau	118.3	35.1	59.0	30.5	--	16.4	--	--	10.8	6.4	--	12.7	289.2
Glacier	--	8.1	5.6	1.2	--	--	--	--	--	3.8	--	1.5	20.2
Hill	31.7	71.8	63.6	82.7	--	12.0	3.9	17.3	--	--	--	13.3	296.3
Liberty	31.9	23.7	2.3	54.0	4.9	--	1.8	--	--	--	--	.6	119.2
Phillips	4.0	8.5	2.0	18.2	--	--	--	--	--	--	--	1.5	34.2
Pondera	47.4	22.3	3.5	18.2	--	--	--	10.0	.5	--	--	3.1	105.0
Teton	36.3	5.9	19.7	12.4	--	5.6	--	3.4	.3	--	--	2.9	86.5
Toole	20.0	30.2	--	42.5	--	--	--	7.5	6.9	--	--	2.4	109.5
N. CENTRAL	289.6	220.6	173.7	309.7	6.1	39.2	9.2	41.6	18.5	10.2	--	39.6	1,158.0
Dawson	--	20.5	1.5	2.5	39.1	--	--	--	--	--	--	6.2	69.8
Garfield	--	26.1	5.5	8.2	1.8	.8	--	--	--	--	--	10.7	53.1
McCone	6.0	55.4	--	10.1	31.9	--	--	--	--	--	--	15.8	119.2
Richland	--	20.0	--	12.7	10.9	2.0	--	--	.8	--	--	5.6	52.0
Roosevelt	--	3.0	--	3.9	8.0	--	--	--	--	--	--	2.8	17.7
Valley	--	8.7	--	.7	8.0	.2	--	--	--	--	--	5.2	22.8
Other	--	.4	--	.9	1.0	--	--	--	--	--	--	.1	2.4
N. EAST	6.0	134.1	7.0	39.0	100.7	3.0	--	--	.8	--	--	46.4	337.0
Cascade	43.4	4.7	29.6	10.5	--	1.0	--	--	4.8	.9	2.8	7.6	105.3
Fergus	36.6	19.2	44.5	9.5	--	3.2	--	3.9	2.7	1.0	2.1	11.3	134.0
Golden Valley	5.0	--	22.0	--	--	--	4.4	--	--	.6	--	12.0	44.0
Judith Basin	14.5	2.4	26.2	8.3	1.0	--	--	4.0	--	--	.4	1.7	58.5
Other	44.7	23.2	6.8	6.4	--	1.0	--	1.0	1.0	--	--	4.1	88.2
CENTRAL	144.2	49.5	129.1	34.7	1.0	5.2	4.4	8.9	8.5	2.5	5.3	36.7	430.0
Gallatin	1.6	8.0	5.0	3.5	--	--	10.0	--	12.5	--	--	8.0	48.6
Other	.4	11.2	6.0	--	--	--	1.2	--	.3	--	--	4.3	23.4
S. WEST	2.0	19.2	11.0	3.5	--	--	11.2	--	12.8	--	--	12.3	72.0
Big Horn	51.4	--	37.7	2.0	6.0	14.5	4.6	--	--	--	--	14.7	130.9
Carbon	1.8	2.0	9.7	--	--	.5	1.5	--	--	--	--	3.4	18.9
Park	3.5	3.8	5.0	--	--	2.0	--	--	--	--	--	6.8	21.1
Stillwater	27.5	8.6	4.0	--	1.0	9.6	4.7	--	--	--	6.0	15.5	76.9
Yellowstone	29.3	--	40.2	3.0	3.0	3.0	13.0	--	--	--	1.3	12.7	105.5
Other	7.0	1.2	.1	--	--	1.2	5.9	--	--	--	--	1.3	16.7
S. CENTRAL	120.5	15.6	96.7	5.0	10.0	30.8	29.7	--	--	--	7.3	54.4	370.0
Carter	10.0	9.0	--	--	22.7	--	--	--	--	--	--	4.9	46.6
Custer	30.5	1.0	4.3	4.0	--	2.5	--	--	--	--	--	.1	42.4
Fallon	--	23.1	--	1.0	6.3	1.8	--	2.0	1.7	--	--	4.2	40.1
Powder River	18.0	1.5	10.3	--	--	1.3	--	--	--	--	--	4.1	35.2
Prairie	20.0	15.5	--	7.0	--	5.0	--	--	--	--	--	1.1	48.6
Rosebud	8.5	--	15.1	3.4	--	4.3	--	--	3.0	--	--	1.7	36.0
Wibaux	--	7.4	--	--	--	--	--	5.9	--	--	--	.8	14.1
S. EAST	87.0	57.5	29.7	15.4	29.0	14.9	--	7.9	4.7	--	--	16.9	263.0
STATE	651.0	496.5	447.3	407.3	146.8	93.1	62.4	58.4	47.1	12.7	12.6	214.8	2,650.0

the second page there, I'm looking at the four different soil tests; and, just to clarify it for me, as I look at test number 4, that shows that the unsprayed area next to the shelter belt indicated no chlorsulfuron; is that correct?

A. Yes, but with the following clarification: What we are saying is nondetected at the .0002-parts-per-million level or below. Below that point, we do not know because we do not see it. That's such a small quantity that our analytical technique cannot see that.

Q. Okay. And, in the third sample, which is indicated as the barley field, south of the house, that showed .00078 parts per million?

A. That's how it's reported, yes.

Q. And the second test, which is the wheat field, south of the house, showed .0032 parts per million?

A. Right.

Q. And test number 1, which is the spring wheat east of the house, showed .0041 parts per million?

A. That's what's reported, yes.

Q. You also indicated that you had had some discussions with a Dr. Zay; is that correct?

A. Dr. Zahnow.

Q. Zahnow. Where is he located out of?

A. He's with DuPont. He's a research chemist,

analytical chemist.

Q. Is he locally here in Montana?

A. No, no, he's back east, the headquarters of DuPont.

Q. And how frequently do you talk with the gentleman or has it been just a couple of times?

A. Well, I got to know him when we brought him to the laboratory for training purposes related to this chemical; became very mutual respect to each other and almost friends. Whenever there is discussion on this type of a compound, I consider him as an expert, from the analytical side. We, therefore, call each other three, four times a year.

Q. Have you ever discussed this particular case with him?

A. No.

Q. Have you discussed the compound chlorsulfuron, in general, with him?

A. Oh, yes.

Q. Does he agree with you that, essentially, the verdict is still out; that is, the entire of body of knowledge about Glean isn't known yet?

A. Oh, I don't know about that. We don't discuss. We discuss just from the analytical viewpoint and not as far as, you know, the effects on the compound in the environment.

MR. BRAAKSMA: I have no further questions.

MR. CASHMORE: No questions.

(Whereupon, the deposition was then concluded.)

* * * * * * * *

DEPONENT'S CERTIFICATE

I, LAZLO TORMA, the deponent in the foregoing deposition, DO HEREBY CERTIFY, that I have read the foregoing -49- pages of typewritten material and that the same is, with any changes thereon made in ink on the correction sheet and signed by me, a full, true and correct transcript of my oral deposition given at the time and place hereinbefore mentioned.

____
LAZLO TORMA

SUBSCRIBED AND SWORN TO before me, this ______ day of __________________, 1987.

____
NOTARY PUBLIC

CERTIFICATE

STATE OF MONTANA)
: ss
County of Gallatin)

I, Abby Wass, Court Reporter - Notary Public in and for the County of Gallatin, State of Montana, do hereby certify:

That the witness in the foregoing deposition was by me first duly sworn to testify the truth, the whole truth, and nothing but the truth in the foregoing cause; that the deposition was then taken before me at the time and place herein named, that the deposition was reported by me in shorthand and later transcribed into typewriting under my direction, and the foregoing -49- pages contain a true record of the testimony of the witness, all done to the best of my skill and ability.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my notarial seal on this the ______ day of ______________, 1987.

NOTARY PUBLIC

①

MISTRY STATION - Analytical Lab. 1628600214.
ana State University
ultural Experiment Station
man, Montana 59717
3383

INVOICE AND REPORT

Nº 4491

Date Received 6/11/85

Date Reported 7/29/85

DEPOSITION EXHIBIT
16
Torma
PENGAD-Bayonne, N.J.

To
Dale & Dean Folkvord
Triple D Grain
Three Forks, MT 59752

Copy To

analysis reported on:
Received Basis ☐
Dry Basis ☑

Sample Description	% Moisture	% Protein	Equivalent % crude protein from NPN	% Ash	% Crude Fiber	% Phosphorus	% Calcium	Carotene mg/lb	% Nitrate					
pring Wheat/east of house														
heatfield/south of house														
arley field/south of house			SEE ATTACHED:											
nsprayed next to shelter belt														

PLEASE DETACH THIS STUB AND RETURN WITH YOUR REMITTANCE

O: **CHEMISTRY Station - Analytical Lab. 1628600214**
McCall Hall
Montana State University
Agricultural Experiment Station
Bozeman, Montana 59715

NVOICE **Nº** 4491

ROM: Above
#478
8/6/85

AMOUNT PAID
$ 1,000⁰⁰

STATEMENT OF CHARGES

No.	Type of Work	Cost
	Sample Prep.	$
	Moisture	$
	Equivalent crude protein from NPN	$
	Protein	$
	Ether Ext.	$
	Ash	$
	Crude Fiber	$
	Phosphorus	$
	Calcium	$
	Carotene	$
	Nitrate	$
4	Glean (Chlorsulfuron) analysis	$ 1,000.00
		$
		$
		$
		$
		$
	TOTAL	$ 1,000.00

DATE: July 26, 1985

TO: Dale and Dean Folkvord

Laszlo Torma

FROM: Laszlo Torma, Assistant Research Chemist

SUBJECT: Report on Glean (Chlorsulfuron) analysis in Soil, Invoice #4491.

Laboratory Number	Sample Description
4491-1	Spring wheat/east of house
4491-2	Wheat field/south of house
4491-3	Barley field/south of house
4491-4	Unsprayed next to shelter beltbelt

RESULTS

Method: Analysis of the Herbicide Chlorsulfuron in Soil by Liquid Chrmatography, Edward W. Zahnow, Journal of Agriculture and Food Chemistry, 1982, 30, 854.

	Chlorsulfuron Found	% Moisture Found
4491-1	0.0041 ppm	9.3
4491-2	0.0032 ppm	9.1
4491-3	0.00078 ppm	6.4
4491-4	None Detected, Detection Limit = 0.0002 ppm (Moisture: 9.7%)	

Sample numbers 1 and 3 were run in duplicate with good agreement. Reagent blanks carried through the procedure showed no Chlorsulfuron. Spike recovery for fortified samples - carried through the analytical method - were 56% and 70%. Results are reported an a "dry weight" basis.

Heidi Hickes

Analyst: Heidi Hickes, Chemist I

3

June 18, 1985

Mr. Dale Folkvord
Triple D Grain
Three Forks, MT 59752

Dear Mr. Folkvord:

We have attempted to call you and your son, but we did not receive an answer. We are writing to you regarding four soil samples that you submitted to this laboratory through Mr. Dave Quist, of the Montana Department of Agriculture. We received these samples on June 11, 1935. Due to the complexity of the analytical method and time required to perform the analyses, I would like you to understand the analyses will not be completed until some time in early July.

If you have any questions, please do not hesitate to call me.

Sincerely yours,

Laszlo Torma
Assistant Research Chemist

fj

~~Glean report -~~

Report on Glean analysis in soil
To : -
From - Laszlo Torma -

Lab #	Sample description
4491- 1	
4491- 2	
4491- 3	
4491-4	Soil, unsprayed

Results:

Method - Analysis of the herbicide Chlorsulfuron in soil by ~~Liquid~~ High Pressure Liquid Chromatography ED. Zahnow, J. of Agriculture Food Chem Vol 30, No5 1987

4491- 1	.0041 ppm
4491- 2	.0032 ppm
4491- 3	.00078 ppm
4491-4	None Detected

Detection limit 0.0002 ppm

samples # -1 and -3 were run in duplicate with good agreement.

Reagent blanks carried through procedure showed no glean

Fortified samples carried through the procedure produced spike recoveries between 56% and 70%.

Chromatograms, worksheets & calculations are in Dept. of Ag. Sample jacket, lab. # 711

sample Glenn Reside, # 71

by HH

~~[illegible]~~ # of hours on soil extraction, ~~[illegible]~~ instrumentation + chromatography interpretation: (20 hrs.)

JJ. .5 hr

Glean residue.

samples: 4491-1, 4491-2, 4491-3, 4491-4

by: HH

# of hours on soil extraction, instrumentation and chromatography interpretation: 59.5 hrs.

Glean Project
total hrs for · HH

7/3/85	4
7/5	2
7	
7/8	6 1/2
7/9	8
7/10	8
7-/11	8
7/12	8
7/15	7
7/16	8
7/17	8
7/18	8
7/19	4
	79.5

20 hrs : #711
59.5 ~~63.5 hrs~~s : 4491-1
4491-2
4491-3
4491-4

# of times each sample was analyzed:
711 : 2

$$\left.\begin{array}{ll} 4491- & 2 \\ 4491-2: & 1 \\ 4491-3: & 2 \\ 4491-4 & 1 \end{array}\right\} 6$$

JRH · 2hr.

#4491
6/11/85

(Father) (Son)
Dale & Dean Folkvord
Triple D Grain
Three Forks, Mt 59

4 Soil

91 - 1 Spring Wheat / East of House
91 - 2 Wheat field / South of House
91 - 3 Barley field / South of House
91 - 4 Unsprayed next to shelter belt

For: Glean

Personnally delivered by Dave Quist, Pesticide Specialist. Not sealed & no special chain of custody requested

⑨

ANALYSIS SHEET

Samples in
Rm 22 Frig #1

Analysis Glean

Method

Date ~~June~~ July, 1985

Values to Report: do not Count as Analyses

to Report

	SAMPLE NUMBER	Claim	Sample Weight	Crucib. Number	Aliquot	Reading	Graph Reading	RESULT
	4491-1	Soil Wheat					✓	0.0041 pp
	4491-2	Soil Wheatfield					✓	0.0032 pp
	4491-3	Soil Barley					✓	0.00078 p
	4491-4	Soil Unsprayed					✓	ND <.0002 p

IS SHEET

Analysis Glean

Method Analysis of the Herbicide Chlorsulfuron in Soil by LC. Ed Zahnow
J. Agric. Food chem., 1981 Vol. 30, No. 5, 1982

Date July 85

	SAMPLE NUMBER	Claim	Sample Weight	Final Vol ~~Crucib. Number~~	Aliquot	Reading	Graph Reading	RESULT (N6)
I:	4491-1	—	50g	1ml	none	.144 x 31/30.5 % .144 x 32.5/25 %	45.35 ÷ 45.35 ÷	3.23ppb 4.13ppb > 3.68 ppb
	~~RB~~	~~—~~		~~1ml~~	~~—~~			ND (ND)
	#711 ~~spKe :~~	~~.036ug~~	~~50g~~	~~1ml~~	—	appears to ~~there.~~	be something cant measure	None (N6)

*NOTE: 1) chromatograms, LAB run sheets and calculation sheets for above run are in file jacket #711 under run I heading

*NOTE: 2) no spike recovery above: Repeat run. also had to reshoot entire string cuz of problems with instrument.
3) RB + spike info. for this run in file jacket #711 under run I

	SAMPLE NUMBER	Claim	Sample Weight	Final Vol	Aliquot	Reading	Graph Reading	RESULT
II:	4491-3	—	50g	1ml	none	.144 x 6/25 1.468 .048 x 15.3/20.5	= .738ppb = .775ppb	→ 0.00078 ppm
	4491-4	—	50g	1ml	—	ND .012 %	45.15	ND <0.0002ppm
	4491-4/spike	.0336ug	50g	1ml	—	.024 x ppm 8/10 % .024 x 7.5/10	.0336 57% 54% >	56%
	RB	—	—	1ml		—	—	ND: clean

*NOTE: 1) chromatograms, LAB run sheets, and calculation sheets for above run are in file jacket #711 under run II heading.

2) no problems in Laboratory or with chromatography

SIS SHEET

Analysis Glean

Method Anlaysisof the Herbicide Chlorsulfura in Soil by LC. Ed Zahnow
J. Agric. Food chem., Vol. 30, No. 5, 1982

Date July 85

	SAMPLE NUMBER	Claim	Sample Weight	Final Vol. ~~Crucib. Number~~	Aliquot	Reading	Graph Reading	RESULT
n III:	4491-1(R)	—	50g	1ml	none	.096 x 81/41 % .144 x 66/51 %	45.35 4.18ppb 45.35 4.11ppb	0.0041ppm
	4491-2	—	50g	1ml	↓	.096 x 61.5/41 % .144 x 52/51	45.45 3.17ppb " 3.23ppb	0.0032ppm
	4491-4	—	50g	1ml		—	—	ND <0.000
	4491-4spke	.096mg	50g	1ml		.048 x 25.5/18 .048 x 24/17.5	71% 69%	70%

*NOTE: 1): chromatograms, LAB run sheets, and calculation sheets for above run are in file jacket #711 under run III ~~Ed~~ heading

2): no problems in Laboratory or with chromatography

	SAMPLE NUMBER	Claim	Sample Weight	Final Vol.	Aliquot	Reading	Graph Reading	RESULT
n IV:	# ~~RB~~	—		~~1ml~~	~~none~~			~~clean~~
	#711 ~~spke~~	.0288mg	50g	1ml	↓	.012 x 13/9.5 ~~.012 x 8/8 %~~	% .0288 57% ~~.0288 42%~~	~~57%~~
	4491-3(R)	—	50g	1ml		.012 x 24.5/9.5 .024 x 23/18	% 46.8 .66ppb % 46.8 .655ppb	0.00066p

NOTE: 1) chromatograms, LAB run sheets, and calculation sheets for above run are in file jacket # 711 under run IV heading

2) no problems in LABoratory

poor baseline: ~~has~~ need to reshoot samples

3) RB + spke info. for this run ~~under~~ in file jacket #711 under run IV

MOISTURE DETERMINATION

Sample # 4491-1

Oven temp. 90°

Beaker and dry sample 37.775

Beaker 27.513g

Dry sample weight 10.262

Wet sample weight 11.313g

1.051

% moisture 9.3%

MOISTURE DETERMINATION

Sample # 4491-2 Oven temp. 85°

Beaker and dry sample 39.551

Beaker 27.631

Dry sample weight 11.920 > 1,1930

Wet sample weight 13.113

% moisture 9.1 %

MOISTURE DETERMINATION

Sample # 4491-3

Oven temp. 85[illegible]°

Beaker and dry sample 37.598

Beaker 27.166

Dry sample weight 10.432 > .7080

Wet sample weight 11.140

% moisture 6.4%

MOISTURE DETERMINATION

Sample # 4491-4

Oven temp. 85°

Beaker and dry sample 37.674

Beaker 27.509

Dry sample weight 10.165

Wet sample weight 11.251

1.0866

% moisture 9.7%